REMARKS

Reconsideration of this application as amended is respectfully requested. Claims 1, 2, 3, 5, 22 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent number 1,711,653 by Quarles ("Quarles") in view of Federal Telephone and Radio Corporation Reference Data for Radio Engineers (Reference Data for Radio Engineers). Claims 11, 13 through 15 and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Drew in view of U.S. Patent number 6,507,606 by Shenoi et al ("Shenoi"). Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Quarles in view of the Reference Data for Radio Engineers and further in view of U.S. Patent number 3,848,098 by Pinel ("Pinel"). Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Quarles in view of Reference Data for Radio Engineers and further in view of Shenoi. Claims 6, 16, and 23 are objected to because of informalities. Claims 6 through 10, 16, 18 through 21, 23 and 25 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 6 through 10, 18 through 21, 23 and 25 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 11, 16, 18 and 23 have been amended. Claims 6 through 10 and 25 have been canceled without prejudice. Amendments have been made to comply with requirements of a previous office action and/or to place the rejected claims in a better form for consideration on appeal.

In general, applicants submit that DSL signals operate at very high propagation frequencies when compared to the POTS voice frequency range of 0-4 Kilohertz. Applicants submit a reference sheet from Techweb Online[tm] showing transmission rates for various DSL implementation being in the 100 kilohertz range for IDSL to the Megahertz range for VDSL.

The Office Action rejected claims 1, 2, 3, 5, 22, and 24 under 35 U.S.C. §103(a) as being obvious in view of Quarles and the Reference Data for Radio Engineers.

Under 35 U.S.C. § 103, patent law requires both every claim limitation to be disclosed by the combination of references as well as evidence of adequate motivation to combine the references.

> To establish a prima facie case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Manual of Patent Examining Procedure ¶ 2143).

Further, the law also requires:

> To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the proposed combination of the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). (Manual of Patent Examining Procedure (MPEP) ¶ 2143.03).

The Examiner states:

> <u>Quarles discloses a load coil</u> comprising a coupled inductor with two windings <u>that inherently have an interwinding capacitance value between them wrapped about an inductor core with capacitors connected diagonally across the windings (i.e., between the input of the first winding and the output of the second winding; and between the input of the second winding and the output of the first winding)</u> (Fig. 1 and page 1, lines 99-102). Claim 1 further claims each have capacitance values at least four times the inter-winding capacitance value. Quarles specifies

> the value of the capacitors as being half of the value to be used between the middle points of the loading coils (page 4, lines 58-64) which is specified to be between .4 and .8 of the total between the wires of one section of the loop. Quarles therefore teaches a value of the capacitors between .2 and .4 of the capacitance of a loop section. Federal Telephone and Radio Corporation teaches that the capacitance of a mile of 24 AWG telephone transmission line is .075 μF (page 111). A 6,000 foot loop section, therefore, has a capacitance of .075(6000/5280) μF which is equal to .085 μF. Hence, the values Quarles teaches are between .2(85) nF and .4(85) nF, that is, between 17 nF and 34 nF. It would have been obvious to one skilled in the art at the time of the invention to utilize the published values for transmission line capacitance to calculate the capacitances taught by Quarles for the purpose of implementing Quarles's invention. The inter-winding capacitance of a load coil is 1,150 pF (see US Patent 6,546,100 to Drew, column 2, lines 32-33), which equals 1.15 nF. As such, the load coil made obvious by the combination of Quarles and FTRC has capacitance values that are at least 14.8 times the inter-winding capacitance value. Therefore, the combination makes obvious all elements of Claim 1. Claim 1 contains language indicating the inductor is configured to counteract capacitance across the look to improve transmission of POTS-based signals and that the capacitive elements are configured to permit passage of DSL signals. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Because the load coil made obvious by the combination of Quarles and FTRC is structurally identical to the load coil of Claim 1, the recitation related to use carries no weight.

(Office Action dated 1-20-04, pp. 6-7) (emphasis added)

> As examiner has demonstrated in the prior Office action, one skilled in the art seeking to practice the invention of Quarles using available reference materials would arrive at capacitor values that meet the claim. Quarles discloses capacitance values relative to the length of a local loop segment. As demonstrated by examiner in the prior Office action, the industry standard segment length of 6,000 feet (or 1.135 miles as shown in the table on p. 110 in FDRC) results in capacitor values that meet the claim. As such, one skilled in the art seeking to practice the invention of Quarles using the disclosure of Quarles and a reference work in the same field endeavor (i.e., FDRC) would arrive at capacitor values that meet the claim. Applicant alleges that the value of interwinding capacitance in Drew is not acceptable. Examiner disagrees.

> Drew discloses a typical interwinding capacitance of a prior art load coil. As such, the value is generally applicable to load coils.

(Office Action dated 1-20-04, pp. 12-13) (emphasis added)

However, applicants respectfully submit that claims 1, 2, 3, 5, 22, and 24 are not obvious under 35 U.S.C. §103(a) in view of Quarles and the Reference Data for Radio Engineers. Claim 1 states:

> 1. A load coil for insertion along a local loop, the load coil comprising:
> a coupled inductor having first and second windings wrapped about an inductor core, each winding having an input and an output, the coupled inductor configured to counteract a parallel capacitance of the local loop to improve transmission of POTS-band signals across the local loop, wherein the first and second windings have an inter-winding capacitance value between them;
> a first capacitive element disposed between the input of the first winding and the input of the second winding; and
> a second capacitive element disposed between the output of the first winding and the output of the second winding, <u>wherein the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the second winding to permit passage of DSL signals across the load coil.</u>

(emphasis added)

Quarles explicitly discloses and teaches that the value of the capacitor is significant to Quarles invention, because the value of the capacitor contributes to the variable effective inductance of the loading unit 5. (See Quarles, page 2, lines 36-58, 85-102, and Equation 1). Equation 1 discloses that the value of the capacitor 8 is used in determining the <u>effective inductance of a network equivalent</u> (FIG. 3) of the <u>loading unit 5</u> in that $L_e = L/(1 + 1/(2p^2LC))$, where <u>C is a capacitance of the condenser 8</u>, L is an inductance of the inductance coil 7, and p is the angular velocity. (Quarles, page 2, lines 36-58) emphasis added) The purpose of Quarles' invention is designed to use the variable effective inductance of the loading unit 5 to correct for transient distortion of

POTS signals over each section of line 6, which depends upon the length of each section of line 6. Quarles discloses, "The present invention proposes to overcome this difficulty [of transient distortion of frequencies in the voice range] by using instead of the inductance coils of the Pupin-Campbell system, an improved loading unit, the effective inductance of which is a variable quantity depending upon the frequency of the transmitted waves. (page 1, lines 63-69). Therefore, Quarles clearly discloses and teaches selecting capacitors having a capacitive value based upon the total capacitance measured between the wires comprising each section of line 6. Quarles discloses and teaches selecting capacitors having a particular capacitive value to compensate for transient distortion in voice signals. The Examiner also acknowledges that Quarles discloses and teaches selecting the capacitance value <u>relative to the capacitance value between the two lines</u> making up a twisted pair. (See quoted Office Action page 12 above).

Since Quarles system teaches and is designed to use the variable effective inductance of the loading unit 5 to correct for transient distortions of signals in the POTS frequency range over each section of line 6, which depends upon the lengths of each section of line 6, it is not surprising that Quarles chooses capacitive values for the condensers 8 (i.e. capacitors) based upon the total capacitance measured between the wires making up a section of line 6. Thus, the selection of the range of the capacitive values for the capacitors in Quarles, referred to as condensers, <u>depends upon a length</u> of each section of line 6.

Quarles does not disclose or suggest that the capacitive values of condensers 8 are selected based upon any capacitance associated with the inductance coils 7.

Therefore, nowhere in Quarles does the reference disclose or suggest the structural limitation of "the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the second winding," as recited in claim 1.

The Reference Data for Radio Engineers merely discloses a capacitance associated with the telephone transmission line. The Reference Data for Radio Engineers discloses the parasitic capacitance between the wires forming the telephone transmission line. The Reference Data for Radio Engineers does not disclose or suggest a capacitance value associated with the inter-winding capacitance between the windings of a load coil. The Reference Data for Radio Engineers does not disclose or suggest a capacitive element having a capacitance value relative to the capacitance value associated with the windings.

Neither reference discloses or suggests the limitation of "the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the second winding," as recited in claim 1.

The Examiner provides a calculation to show a value of a capacitor in an attempt to achieve a stated structural limitation of claim 1. The structural limitation of claim 1 being that the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the second winding to permit passage of DSL signals across the load coil. However, the resultant computed capacitance values of the capacitor by the Examiner, if even correct, are based upon the length of the wire

forming that segment of the loop. The capacitance value of the capacitors in Quarles are not chosen based upon an inter-winding capacitance value of the load coil. Furthermore, the value of the capacitors in the 1929 Quarles reference are certainly not chosen based upon permitting passage of signals in the DSL frequency range. Some DSL frequencies being, for example, 1000 times greater than those in the POTS frequency range.

Even if adequate motivation existed to combine Quarles and the Reference Data for Radio Engineers, the selection of the range of the capacitive values for the capacitors as taught by Quarles would depend upon a length of each section of line to compensate frequencies in the POTS voice range (0-4 kilohertz) for transient distortion.

The combination of Quarles and the Reference Data for Radio Engineers could at best suggest a capacitive value for a capacitor based upon the length of each section of line in order to compensate frequencies in the voice range for transient distortion. Therefore, claim 1 is not rendered obvious by Quarles and the Reference Data for Radio Engineers, individually or in combination.

Further, claim 1 is not rendered obvious by the combination of Quarles and the Reference Data for Radio Engineers with an inter winding capacitance value from Drew.

The Examiner asserts that one skilled in the art, could looking at the 1929 Quarles, the data chart of the Reference Data for Radio Engineers, a load coil from a third reference Drew, performed the above mentioned calculation and arrive at claim 1's structural limitation without the aid of improper hindsight.

Applicants submit three transformer references with this amendment. Accordingly, applicants submit interwinding capacitance between the windings forming

a load coil can be affected by many factors such as the proximity of the two windings, the composition of the windings, whether insulation surrounds each winding, etc. The basic formula for determining a capacitance value between any two conductive surfaces such as the two winding coils is the Dielectric Constant times the number of plates of the capacitor times the area of the plates all divided by the distance between the plates. Applicants submit although the calculation provided by the Examiner is laudable. The calculation is merely the product of inappropriate hindsight in an attempt to achieve a capacitance ratio stated in claimed 1. However, the resulting calculation from the Examiner merely determines a capacitance value to balance the parallel parasitic capacitance value between two lines forming the loop and is based on the length of the loop. Claim 1 recites language of a capacitance value based on the interwinding capacitance value to pass signals in the DSL frequency range, which may not have any correlation at all to the length of a loop. The interwinding capacitance value may be effected by many factors such as how close the two windings are, whether the windings have insulation or not, what the Dielectric Constant is, the number & area of the coils, etc., yet the length of a telephone loop is not a factor in determining an inter winding capacitance value.

Also, Drew teaches away from claim 1 limitations. Drew discloses a capacitor connected in parallel to a winding. Drew discloses:

> The device further has <u>a capacitor connected in parallel across each winding</u>. The values of the capacitors are chosen to provide a low impedance path that bypasses the windings for frequencies in the range of 20 kHz to 1.1 MHz

(Drew, Abstract, emphasis added).

> A capacitor 46 having a capacitance of C_{tc} is connected in parallel across the first winding 42, and another capacitor 48 also having a capacitance of C_{tc} is connected in parallel across the second winding 44.

(Drew Col. 3, Lns. 12-15)

Drew discusses and illustrates the interwinding capacitance of the windings. (Drew, Figures 2, 4, and 5 labeled C_{ic}, Col. 2, Ln. 24 - Col. 3 Ln. 20.) However, Drew discloses and teaches to place a capacitor (C_{tc}) in parallel to the winding (L_{choke}) and to choose the value of the capacitor relative to the inductance value of the winding that the capacitor shares a parallel relationship with. Drew discloses:

> The values of the inductance L'_{choke} and capacitance C'_{tc} are 7.5 mH and 100 nF, but they could be in the ranges of 2.5 mH to 10 mH and 50 nF to 200 nF, respectively.

(Drew Col. 3, Lns. 12-15)

Thus, Drew does not teach selecting a capacitance value for a capacitor relative to the inter winding capacitance value between the windings.

As discussed above, Quarles also teaches away from such a limitation. Quarles discloses and teaches selecting capacitors having a capacitive value based upon the total capacitance measured between the transmission wires to compensate for transient distortion in frequencies in the voice range. Therefore, no reference cited by the Examiner contains adequate motivation to combine to create the structural limitation of "a second capacitive element disposed between the output of the first winding and the output of the second winding, wherein the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the second winding to permit passage of DSL signals across the load coil." Further, the combination all three references would still not disclose all of the limitations stated in claim 1.

Federal circuit case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." In re Lee, 277 F.3d 1338, 1344 (Fed. Cir. 2002). The PTO bears the burden of proving an obviousness type rejection based on findings of fact and not based on conclusive statements. In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999). Adequate findings of fact can come from several sources. Id. The motivation to combine reference must be found in the cited references themselves. Id. Alternatively, the PTO may establish that one of ordinary skill in the art would have been motivated to combine the references with articulated findings of fact regarding: 1) the level of skill in the art; 2) the relationship between the fields of the cited art; and 3) the particular features of the prior art references that would motivate one of ordinary skill in applicant's particular art to select elements disclosed in references from a wholly different field. Id.

As discussed above, neither Quarles, the Reference Data for Radio Engineers or Drew, teaches or suggests the limitation of "a second capacitive element disposed between the output of the first winding and the output of the second winding, wherein the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the second winding to permit passage of DSL signals across the load coil."

In addition, the articulated findings of fact do not provide adequate motivation to suggest the limitations in claim 1. The loading coil disclosed in Drew electrically and physically differs in structure that the loading coil disclosed in Quarles. Therefore, the inter winding capacitance value of the loading coil disclosed in Drew and Quarles may

be quite a bit different. Thus, a comparison of an interwinding capacitance value of the loading coil disclosed in Drew to the calculated capacitive value from Quarles and a line capacitance value from the Reference Data for Radio Engineers may be completely inaccurate and does not provide adequate findings of fact factor required by the law. Once again the interwinding capacitance value of the Quarles loading coil and the Drew loading coil is most likely different because the two coils differ electrically and physically in structure.

As a side note, it seems like the Examiner picked a random length of a loop section to make this calculation work. The applicants' patent application supplies example loop lengths between 2250 feet and 4500 feet for 24 AWG wire. The Examiner chose to use the capacitance value for a 6000 foot length of 24 AWG in this calculation. Irregardless, any correlation of the values of the capacitors in Quarles to the inter winding capacitance values stated in Drew is mere conjecture and not evidence.

Also, motivation of one of ordinary skill in the DSL art is lacking to select elements disclosed in references. The motivation is lacking in that Quarles teaches selecting capacitors having a capacitive value based upon the total parasitic capacitance measured between the wires comprising each section of line 6 to compensate for transient distortion in frequencies in the voice range. The 1929 Quarles reference does not disclose or suggest that frequencies in the DSL ranges will travel across plain old telephone lines and Drew teaches away from selecting capacitors having a capacitive value based a capacitance value associated with interwinding capacitance value between inductors. Further, the examiner did not articulate 1) the

level of skill in the art; and 2) the particular features of the prior art references that would motivate one of ordinary skill in applicant's particular art to select elements disclosed in those references to construct the limitations in claim 1.

Therefore, claim 1 is not rendered obvious by Quarles and the Reference Data for Radio Engineers, individually or in combination.

Applicants respectfully believe the Examiner's reliance on Ex Parte Masham is also misguided. In the Electronic/electrical arts, virtually every possible structural configuration of capacitors relating to inductors has been in existence even prior to the 1929 Quarles reference cited by the Examiner. However, whoever invents any new and useful improvement on any <u>process</u>, machine, <u>manufacture</u> or composition of matter <u>may obtain a patent</u>. (See 35 U.S.C. 101). Applicants respectfully submit that at least three factors affect the novelty of invention in the Electrical/electronic Arts. These three factors are 1) the structural relationship of electronic components relative to the other electronic components, 2) the component values associated with each of these electronic components, and 3) the technical application in which the electronic circuit is being employed. The Examiner wishes to discount two of these factors. Depending on the electronic components chosen, the circuit configuration of those components, and the values chosen for the recited electronic component limitations, the overall claimed electronic circuit can produce very different results.

Applicants respectfully submit that the limitation of "the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the second winding to permit passage of DSL signals across the load coil" recited in claim 1, is a

structural limitation. All capacitors and inductors have values that affect the reactive impedance presented to signals passing through those reactive components. The reactive impedance of a capacitor is $Xc = 1/2\pi f c$. C is the capacitance value of a electronic component. f is the frequency of a signal propagating through that component. Depending on the value selected for those reactive components, the signals propagating at an associated frequency and passing through those reactive components may be blocked entirely or pass with little attenuation. As such, all of the wording in this limitation must be considered for patentability. The value of the capacitive elements cooperating with the windings of the load coil is chosen to pass signals in the DSL frequency range across the load coil.

The Examiner stated that "a claim containing a 'recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus' if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham,* 2 *USPQ2d* 1647 (Bd. Pat. App. & Inter. 1987). Because the load coil disclosed by Quarles is structurally identical to the load coil of Claim 1, the recitation related to use carries no weight." (Office Action of 1/27/2003, p. 2-3). Applicants respectfully submit that *Ex parte Masham* states that "a recitation with respect to the <u>material intended to be worked upon</u> by a claimed apparatus does not impose any structural limitations upon the claimed apparatus which differentiates it from a prior art apparatus satisfying the structural limitations of that claimed." Applicants respectfully submit that the limitation of "the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the

second winding to permit passage of DSL signals across the load coil" recited in claim 1, is not a "recitation with respect to the material intended to be worked upon. Further, the limitation is not a recitation of an intended use absent of structural limitations to support that use." Rather, the limitation of "the first capacitive element and the second capacitive element each have capacitance values that are at least four times the inter-winding capacitance value between the first winding and the second winding to permit passage of DSL signals across the load coil" recited in claim 1, is a <u>structural limitation</u>, which differentiates this claim over Quarles and any reliance on *Ex parte Masham*. Based on the capacitance value chosen, signals propagating at a particular frequency, such as at DSL frequencies, across the load coil will pass freely or be attenuated. In the Electronic arts that language is a structural relationship because reactive impedance presented to a signal always is directly proportional to the frequency at which the signal is propagating at. ($Xc = 1/2\pi fc$) Further, as a structural limitation, each and every limitation must be considered and given weight to the patentability of this claim.

Furthermore, MPEP 2131.03 states that "prior art which teaches a range within, overlapping, or touching the claimed range anticipates if the prior art range discloses the claimed range with "sufficient specificity." Claim 1 recites that "the first capacitive element and the second capacitive element each have <u>capacitance values that are at least four times the inter-winding capacitance value</u>." Applicants respectfully submit that Quarles is silent as to whether any relationship exists between the capacitance values and an inter-winding capacitance value. Accordingly, Quarles can not disclosed a range with sufficient specificity if it does not even discuss that relationship. Therefore,

Quarles does not even disclose the structural limitation of "capacitance values that are at least four times the inter-winding capacitance value" with sufficient specificity.

Lastly, if the Examiner still believes that the above limitation is a product by process limitation without explicit structure, then applicants assert MPEP 2113 and *In re Garnero* control the patentability of the claims in this application. "The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially . . where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product." See, MPEP 2113 and *In re Garnero* ,412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979).

As such, for all the reasons stated above claim 1 is not rendered obvious by Quarles and the Reference Data for Radio Engineers under 35 USC 103(a).

Given that claims 2, 3, and 24 depend on and include the limitations of claim 1, applicants respectfully submit the claims 2, 3, and 24 are also not obvious in view of Quarles and the Reference Data for Radio Engineers.

The Office Action rejected claim 22 under 35 U.S.C. §103(a) as being obvious in view of Quarles and the Reference Data for Radio Engineers. However, Applicants respectfully submit that claim 22 is not obvious in view of Quarles and the Reference Data for Radio Engineers. Claim 22 recites:

> 22. A system . . . comprising:
> . . .
> a second inductor winding wrapped about the inductor core and coupling the second wire to the fourth wire; and
> capacitive elements configured to pass the DSL signals traversing the first and second local loops, the capacitive elements including
> a first capacitor coupling the first wire to the fourth wire, and

> a second capacitor coupling the second wire to the third wire, wherein the first capacitor and the second capacitor have capacitance values that are at least four times an inter-winding capacitance value between the first inductor winding and the second inductor winding.

(emphasis added)

As discussed above, Drew does not teach or suggest a second inductor winding coupling the second wire to the fourth wire and a second capacitor coupling the second wire to the third wire. Drew does not teach or disclose creating a L-C bridge network between the input and output windings of the load coil. In contrast, Drew discloses and teaches the configuration of placing a capacitor (C_{tc}) in parallel to the winding (L_{choke}). (Drew, Col. 3 Lns 2-25 and figures 2, 4, and 5) As discussed, Drew also teaches to choose the value of the capacitor relative to the inductance value of the winding that the capacitor shares a parallel relationship with. (Drew, Col. 3 Lns 2-25 and figures 2, 4, and 5) Drew does not teach or disclose capacitors having capacitance values that are at least four times an inter-winding capacitance value between the first inductor winding and the second inductor winding. As discussed, Quarles teaches away from such a limitation. Quarles does not teach or suggest a second capacitor have capacitance values that are at least four times an inter-winding capacitance value between the first inductor winding and the second inductor winding. Quarles discloses and teaches selecting capacitors having a capacitive value based upon the total parasitic capacitance measured between the wires comprising each section of line 6 to compensate for transient distortion in frequencies in the voice range.

The Reference Data for Radio Engineers is a chart that merely provides parasitic capacitance values based upon a length of a telephone loop wires. The Reference

Data for Radio Engineers does not teach or suggest a second capacitor have capacitance values that are at least four times an inter-winding capacitance value between the first inductor winding and the second inductor winding.

Further, neither Quarles nor the Reference Data for Radio Engineers teach or suggest the limitation of "capacitive elements configured to pass the DSL signals traversing the first and second local loops."

As discussed, inadequate motivation exists to combine Quarles and the Reference Data for Radio Engineers. Furthermore, even if Quarles and the Reference Data for Radio Engineers were combined, that combination would not teach the structural limitation of <u>a second capacitor having capacitance values</u> <u>that are</u> at least four <u>times</u> <u>an inter-winding capacitance value</u> between the first inductor winding and the second inductor winding. Further, combination would not teach the structural limitation of "capacitive elements configured to pass the DSL signals traversing the first and second local loops." Therefore, claim 22 is not rendered obvious under 35 USC 103(a) by Quarles and the Reference Data for Radio Engineers, individually or in combination.

The Office Action rejected claim 24 under 35 U.S.C. §103(a) as being obvious in view of Quarles and the Reference Data for Radio Engineers. However, Applicants respectfully submit that independent claim 23, as amended, is not obvious in view of Quarles and the Reference Data for Radio Engineers. Claim 23, as amended, recites:

> 23. A system to improve simultaneous transmission of POTS-band signals and DSL signals across a local loop, the system comprising:
> a first local loop, the first local loop including
> a first wire, and
> a second wire;
> a second local loop, the second local loop including
> a third wire, and

a fourth wire;
a coupled inductor configured to condition the POTS-band signals traversing the first and second local loops, the coupled inductor including
an inductor core,
a first inductor winding wrapped about the inductor core and coupling the first wire to the third wire, and
a second inductor winding wrapped about the inductor core and coupling the second wire to the fourth wire; and
capacitive elements configured to pass the DSL signals traversing the first and second local loops, the capacitive elements including
a first capacitor coupling the first wire to the fourth wire, and
a second capacitor coupling the second wire to the third wire, wherein the <u>first capacitive element electrically connects in parallel with the inter-winding capacitance between the first inductor winding and the second inductor winding</u>.

(emphasis added)

As discussed above, Drew does not teach or suggest a capacitor to electrically connect in parallel with the inter-winding capacitance between the first inductor winding and the second inductor winding. Drew teaches schematically illustrates the inter-winding capacitance between the inductor windings but teaches away from such a limitation. In contrast, Drew discloses and teaches to place a capacitor (C_{tc}) in parallel to the winding (L_{choke}) and to choose the value of the capacitor relative to the inductance value of the winding the capacitor shares a parallel relationship with. Quarles does not teach or suggest a capacitive element configured to pass the DSL signals traversing the first and second local loops including a capacitor to electrically connect in parallel with the inter-winding capacitance between the inductive windings. Quarles teaches away from such a limitation. As discussed, Quarles discloses and teaches selecting capacitors having a capacitive value based upon the total capacitance

measured between the wires comprising each section of telephone loop to compensate for transient distortion in frequencies in the voice range.

The Reference Data for Radio Engineers is a chart that merely provides parasitic capacitance values based upon a length of a telephone loop wires. The Reference Data for Radio Engineers is completely silent about a capacitor electrically connecting in series with an inter-winding capacitance of the inductive winding. The Reference Data for Radio Engineers does not teach or suggest a capacitor electrically connecting in series with an inter-winding capacitance of the inductive winding.

As discussed above, inadequate motivation exists to combine Quarles and the Reference Data for Radio Engineers. Even if Quarles and the Reference Data for Radio Engineers were properly combined, the combination would still not teach or suggest a capacitive elements configured to pass the DSL signals traversing the first and second local loops including a capacitor to electrically connect in series with an inter-winding capacitance of the inductive winding.

Therefore, claim 23 is not rendered obvious under 35 U.S.C. §103(a) by Quarles and the Reference Data for Radio Engineers, individually or in combination.

Given that claim 24 depends on and includes the limitations of claim 23, applicants respectfully submit the claim 24 is also not obvious in view of Quarles and the Reference Data for Radio Engineers.

The Office Action rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Quarles in view of the Reference Data for Radio Engineers and further in view of U.S. Patent number 3,848,098 by Pinel. However, Applicants

respectfully submit that independent claim 1 is not obvious in view of Quarles, Pinel, and the Reference Data for Radio Engineers.

Under 35 U.S.C. § 103, patent law requires both every claim limitation to be disclosed by the combination of references as well as adequate motivation to combine the references.

Pinel is completely silent regarding circuit capacitance values relative to the inter winding capacitance values between a first and second inductor. Further, Pinel, issued in 1969, is completely silent regarding permitting signals in the DSL frequency range and the POTS frequency range over the same POTS lines. Accordingly, Pinel is completely silent regarding selecting components to support passing signals in the DSL frequencies.

As discussed above, the combination of Quarles and the Reference Data for Radio Engineers does not disclose the limitations of independent claim 1.

Applicants also assert inadequate motivation to combine exists to combine Quarles, Pinel, and the Reference Data for Radio Engineers. As such, for all the reasons above, independent claim 1 is not rendered obvious under 35 U.S.C. §103(a) by Quarles, Pinel, and the Reference Data for Radio Engineers, individually or in combination.

Given that claim 4 depends on and includes the limitations of claim 1, applicants respectfully submit the claim 4 is also not obvious in view of Quarles, Pinel, and the Reference Data for Radio Engineers.

The Office Action rejected claims 11, 13 through 15 and 17 under 35 U.S.C. 103(a) as being unpatentable over Drew in view of Shenoi. The Examiner states:

> Drew discloses capacitors (Fig. 4, reference 46, 48; column 3, lines 2-3) connected in parallel across the first winding and the second winding. Claim 11 further claims the capacitive elements have capacitance values relative to a capacitance value of either the coupled inductor to improve transmission of DSL signals across the load coil. Drew discloses the capacitors that correspond to the capacitive elements claimed having capacitance values of 50 nF to 100 nF (column 3, lines 12-15) and a parasitic winding capacitance (Fig. 4, reference C'w; column 3, lines 5-12) that corresponds to the intra-winding capacitance claimed having a value of 288 pF (0.288 nF) (column 2, lines 26-28). Further, Drew discloses that these capacitance values allow the capacitors to provide a low impedance path for high frequency signals to bypass the windings (i.e., permit passage of DSL signals across the load coil) (column 3, lines 18-20). Therefore, Drew anticipates all elements of Claim 11 with the exception of a DSL signal repeater for disposal along the local loop to amplify the DSL signals, the repeater including a load coil for conditioning POTS signals. Shenoi discloses a DSL repeater (Fig. 4, reference 400; column 7, lines 54-55) that includes load coils (column 7, lines 59-63). It would have been obvious to one skilled in the art at the time of the invention to combine the repeater taught by Shenoi with the load coil taught by Drew for the purpose of providing DSL over long loaded loops.

(Office Action dated 1-20-04, pp. 10-11)

> Regarding [applicants earlier dated office action arguments], Claims 11, 13 through 15 and 17, applicant alleges that the combination of Drew and Shenoi fails to make obvious "capacitive elements have capacitance values relative to a capacitance value of the coupled inductor". Examiner respectfully disagrees. Any capacitance has a value relative to any other capacitance. For example, if a first capacitance has a value of C1 and a second capacitance has a value C2 then inherently either C1>C2 or C1<C2 or C1=C2. As such, C1 has a value relative to C2. Applicant makes reference in the arguments to "the selection of capacitive values", but in a claim that claims both a product and the method of making the product (i.e., a product-by-process claim), patentability is determined based on the product itself. As such, limitations relating to the method by which the capacitance values are selected carry no weight.

(Office Action dated 1-20-04, p. 13)

However, Applicants respectfully submit that claims 11, 13 through 15 and 17 are not obvious in view of Drew and Shenoi. Independent claim 11, as amended, states:

> 11. A system for transmitting DSL and POTS signals over a local loop, the system comprising:
>
> a first load coil for disposal along the local loop to condition the POTS signals, the first load coil including a coupled inductor and multiple capacitive elements for increasing an effective capacitance of the coupled inductor, wherein <u>the multiple capacitive elements have capacitance values relative to an interwinding capacitance value of the coupled inductor</u> to improve transmission of DSL signals across the first load coil; and
>
> a first DSL signal repeater for disposal along the local loop in series with the first load coil to amplify the DSL signals, the first DSL signal repeater including a second load coil for conditioning POTS signals passing there through.

(emphasis added)

As discussed above, Drew does not teach or suggest the limitation "capacitive elements having capacitance values relative to an inter winding capacitance value of the coupled inductor." Drew discloses and teaches to place a capacitor (C_{tc}) in parallel to the winding (L_{choke}) and to <u>choose the value of the capacitor relative to the inductance value of the winding the capacitor shares a parallel relationship with</u>. Shenoi is completely silent on the selection of capacitive values of components in the load coil. Therefore, neither Drew nor Shenoi, individually or in combination, teach or suggest any capacitive elements having capacitance values relative to an inter winding capacitance value of the coupled inductor. As such, claim 11 is not obvious under 35 U.S. C. 103(a) in view of Drew and Shenoi.

Given that claims 13 through 15 depend on and include the limitations of claim 11, applicants respectfully submit the claims 13 through 15 are also not obvious under 35 U.S. C. 103(a) in view of Drew and Shenoi.

Likewise, Independent claim 17 states:

> 17. A system for transmitting DSL and POTS signals over a local loop, the system comprising:

> load coil means positioned along the local loop, the load coil means comprising inductive means for conditioning POTS signals as they traverse the local loop and <u>capacitive means having capacitance values relative to an inter-winding capacitance value of the inductive means</u> coupled to the inductive means for facilitating passage of DSL signals across the load coil; and
>
> DSL signal amplification means positioned along the local loop for amplifying DSL signals as they traverse the local loop.

(emphasis added)

As discussed above, neither Drew nor Shenoi, individually or in combination, teach or suggest any capacitive elements having capacitance values relative to an inter winding capacitance value of the coupled inductor. Drew, in fact, specifically teaches away from such a limitation. As such, claim 17 is not obvious under 35 U.S. C. 103(a) in view of Drew and Shenoi.

The Office Action rejected claims 11 and 12 under 35 U.S.C. 103(a) as being unpatentable over Quarles in view of Reference Data for Radio Engineers and further in view of Shenoi. The Examiner states:

> All elements of Claim 11 are comprehended by Claim 1 with the exception that Claim 11 claims a DSL signal repeater for disposal along the local loop to amplify the DSL signals, the repeater including a load coil for conditioning POTS signals. <u>As stated above apropos of Claim 1, the combination of Quarles and FTRC makes obvious all elements of that claim.</u> Therefore, the combination makes obvious all elements of Claim 11 with the exception of a DSL signal repeater for disposal along the local loop to amplify the DSL signals, the repeater including a load coil for conditioning POTS signals. <u>Shenoi discloses a DSL repeater (Fig. 4, reference 400; column 7, lines 54-55) that includes load coils (column 7, lines 59-63). It would have been obvious to one skilled in the art at the time of the invention to combine the repeater taught by Shenoi with the combination made obvious by Quarles and FTRC for the purpose of providing DSL over long loaded loops.</u>
>
> Claim 12 claims the system of Claim 11 wherein the coupled inductor has first and seconds windings with capacitive elements disposed diagonally across those windings. As stated above apropos of Claim 11, the combination of Quarles and FTRC makes obvious all elements of that claim. In addition, Quarles discloses diagonal disposal of capacitors

> in a loading coil. Therefore the combination makes obvious all elements of Claim 12.

(Office Action dated 1-20-04, pp. 8-9) (emphasis added)

As discussed above, not even one of these three references discloses, teaches or even suggest the limitation "capacitive elements that have capacitance values relative to an interwinding capacitance value of the coupled inductor to improve transmission of DSL signals across the first load coil." All three references are completely silent about capacitive elements that have capacitance values relative to an interwinding capacitance value of the coupled inductor. Quarles in fact teaches away such that the capacitors (condensers) 8 have a capacitance values relative to the length of the line 8. As discussed above, the actual length of a loop does not factor in to the formula for determining a capacitance value of a component or between two components. Further, the Office Action provides in adequate motivation to combine these three references. The Examiner does not cite to any drawings or text within these three references that suggest such a combination. The Examiner does not provide any reasoning why it would be obvious to combine a data chart, a 1929 reference, and a modern day patent on a DSL repeater patent that includes load coils other than they all relate to the telecommunication arts and achieve a result of claim 11. The Examiner merely concludes and states "It would have been obvious to one skilled in the art at the time of the invention to combine the repeater taught by Shenoi with the combination made obvious by Quarles and FTRC for the purpose of providing DSL over long loaded loops." Therefore, on this basis alone, applicants respectfully submit impressible use of hindsight has occurred and the obviousness rejection of claim 1 has been overcome.

The Office Action objected to claims 6, 16 and 23 because of grammatical informalities. The Examiner objects to the term "to" and states:

> Claim 6 includes the limitation "wherein the first capacitive element to electrically connect in series with the intra-winding capacitance of the first winding". As recited, this limitation is grammatically incorrect. Examiner assumes it is intended as "wherein the first capacitive element is electrically connected in series with the intra-winding capacitance of the first winding".
>
> Claim 16 includes the limitation "wherein the first capacitive means to electrically connect in series with an inter-winding capacitance of the inductive means". As recited, this limitation is grammatically incorrect. Examiner assumes it is intended as "wherein the first capacitive means is electrically connected in series with an inter-winding capacitance of the inductive means".
>
> Claim 23 includes the limitation "wherein the first capacitive element to electrically connect in series with the inter-winding capacitance f the first inductor winding". As recited, this limitation is grammatically incorrect. Examiner assumes it is intended as "wherein the first capacitive element is electrically connected in series with the inter-winding capacitance of the first inductor winding".

(Office Action dated 1-20-04, p. 2)

Applicants respectfully disagree with the Examiner's assertions about the rules of English grammar. However, applicants submit that claims 16, and 23, as amended, overcome the above rejections. Claim 6 has been canceled without prejudice.

The Office Action rejected claims 6 through 10 and 25 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner states:

> Claim 6 includes the limitation "wherein the first capacitive element to electrically connect in series with the intra-winding capacitance of the first winding". This configuration is not described in the original specification.
>
> Claims 7 through 10 and 25 fail to comply with the written description requirement due to dependence from Claim 6.

(Office Action dated 1-20-04, p. 3)

Claims 6-10 and 25 have been canceled without prejudice.

The Office Action rejected claim 16 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner states :

> Claim 16 includes the limitation "wherein the first capacitive means to electrically connect in series with an inter-winding capacitance of the inductive means". This configuration is not described in the original specification.

(Office Action dated 1-20-04, p. 3)

Applicant respectfully asserts that claim 16, as amended, is adequately supported under 35 U.S.C. 112, first paragraph. Applicants assert that claim 16, as amended, is supported throughout the text and drawings of the application as filed. However, applicants specifically direct the Examiners attention to the top paragraph on page 4, various paragraphs on pages 12 and 13, and figure 3. These sections discuss the cooperation between the inter-winding capacitance of the windings. For example, applicants' specification discloses:

> <u>One capacitor is disposed between the input of a first inductor winding and the input of the second inductor winding</u>; <u>the other capacitor is disposed between the output of the second inductor winding and the output of the first inductor</u> <u>to increase the effective inter-winding capacitance</u> of the coupled inductor for improving high frequency signal transmission across the load coil.

(Applicants' specification page 4, Lns. 14-18) (emphasis added)

Also, figure 3 illustrates capacitors 320, 322 in parallel with the inter-winding capacitance between winding 302 and winding 304. Applicants' specification further discloses:

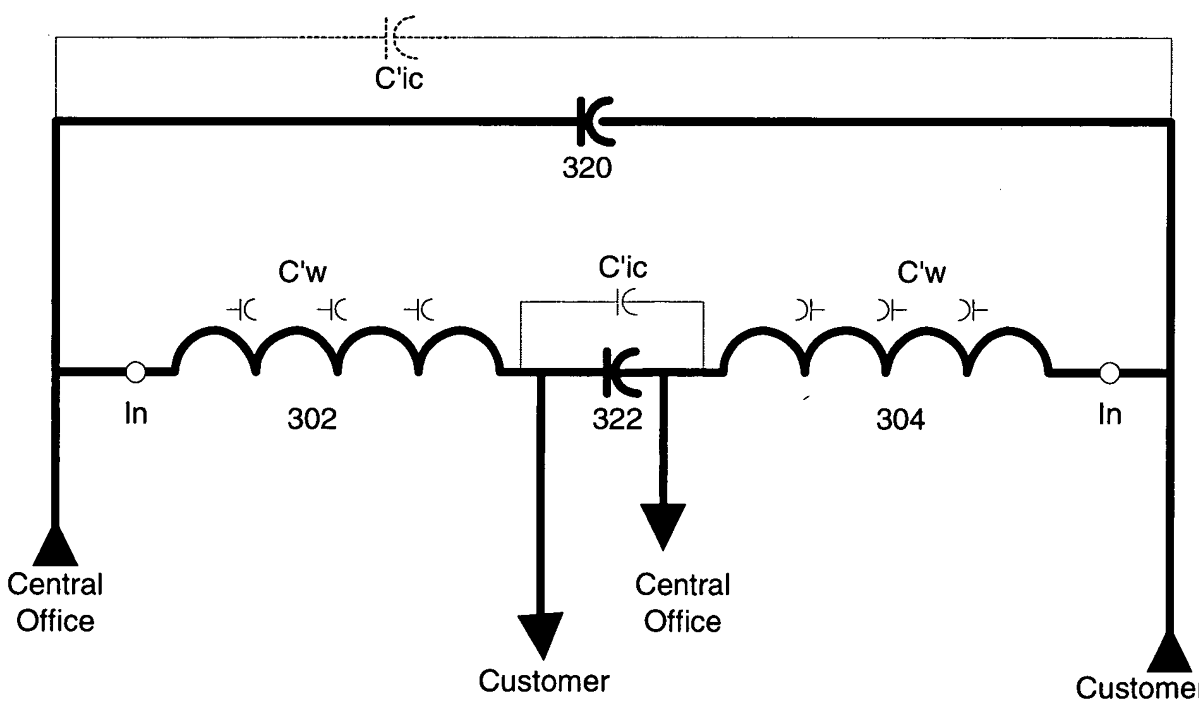
> The load coil 130 also includes capacitive elements, such as capacitors 320 and 322, to increase the effective inter-winding capacitance of the coupled inductor 308 for permitting higher frequency signals, such as xDSL signals, to traverse the load coil 130 with low attenuation. As

> shown, the capacitor 320 is disposed between the lead 312 of winding 302 and the lead 316 of the winding 304. The capacitor 322 is disposed between the lead 318 of the winding 304 and the lead 314 of the winding 302. <u>In this configuration, the capacitors 320 and 322 increase the effective inter-winding capacitance of the coupled inductor 308</u>.

(Applicants' specification page 13, Lns. 14-18) (emphasis added)

Applicants note that adding capacitances electrically in parallel increases the total capacitance value. For capacitors in parallel, the applicable formula to calculate total effective capacitance is: Capacitance total = Capacitance 1 + Capacitance 2.

Applicants present a redrawn electrical equivalent circuit of figure 3. The inter winding capacitance (C'ic) between the inputs and outputs of the pair winding is shown in redrawn figure 3.



Note, a similar inter winding C'ic and intra winding C'w capacitance circuit is illustrated by Figures 2, 4, and 5 in the Drew reference sited by the Examiner.

Capacitor 322 is in parallel with the inter-winding capacitance between the output of the

windings 302, 304. Capacitor 320 is in parallel with the inter-winding capacitance of between the inputs of the windings 302, 304. Therefore, Applicants respectfully submit that adequate support for claim 16 can be found through the text and drawings of the application as filed and overcomes the above rejection.

The Office Action rejected claims 18 through 21 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner states:

> Claim 18 includes the limitation "amplifying the DSL signals between the first segment of the local loop and the second segment of the local loop but after the . . . coupled inductor". This configuration is not described in the original specification. Claims 19 through 21 fail to comply with the written description requirement due to dependence from Claim 18.

(Office Action dated 1-20-04, p. 3)

Applicant respectfully asserts that claim 18, as amended, is adequately supported under 35 U.S.C. 112, first paragraph. Claim 18, as amended, states "amplifying the DSL signals between the first segment of the local loop and <u>a third segment</u> of the local loop but after the coupled inductor and the capacitive elements." Applicants assert that claim 18, as amended, is supported throughout the text and drawings of the application as filed. However, applicants specifically direct the Examiner's attention to figure 1. Figure 1 shows an example implementation where a first segment of loop 116 connects to load coil 130 and then to an amplifying repeater 132. After the amplifying repeater 132, several local loop segments 116 connect to that electrical pathway. Therefore, Applicants respectfully submit that adequate support for claim 18 can be found throughout the text and drawings of the application as filed and

overcomes the above rejection. As such, claims 19-21 also overcome the above rejection.

The Office Action rejected claim 23 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner states :

> Claim 23 includes the limitation "wherein the first capacitive element to electrically connect in series with the inter-winding capacitance of the first inductor winding". This configuration is not described in the original specification.

(Office Action dated 1-20-04, p. 4)

Applicants respectfully assert that claim 23, as amended, is adequately supported under 35 U.S.C. 112, first paragraph. Claim 23, as amended, states "a capacitive element electrically connects in parallel between the inter-winding capacitance of the first inductor winding and the second inductor winding." However, as discussed above, applicants specifically direct the Examiners attention to the top paragraph on page 4, various paragraphs on pages 12 and 13, and figure 3. These sections discuss the cooperation between the inter-winding capacitance of the windings. Therefore, Applicants respectfully submit that adequate support for claim 23 can be found through the text and drawings of the application as filed and overcomes the above rejection.

The Office Action rejected claims 6 through 10 and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6 through 10 and 25 have been canceled without prejudice.

The Office Action rejected claims 18 through 21 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner states:

> Claim 18 includes the limitations "inductively coupling a first segment of the local loop to a second segment of the local loop via a coupled inductor" and "amplifying the DSL signals between the first segment of the local loop and the second segment of the local loop but after the . . . coupled inductor". Since the inductor couples together the two loop segments, it is unclear how the amplification can simultaneously take place between the segments and after the inductor. Therefore the claim is indefinite. Claims 19 through 21 are indefinite due to dependence on Claim 18.

(Office Action dated 1-20-04, pp. 4-5)

Applicants respectfully assert that claim 18, as amended, particularly points out the invention under 35 U.S.C. 112, second paragraph. Claim 18, as amended, states "amplifying the DSL signals between the first segment of the local loop and <u>a third segment</u> of the local loop but after the coupled inductor and the capacitive elements." Claim 18, as amended, does not require simultaneous amplification and inductive coupling." Therefore, Applicants respectfully submit that claim 18 is not indefinite or ambiguous and overcomes the above rejection.

The Office Action rejected claim 23 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner states:

> Claim 23 includes the limitations "a first capacitor coupling the first wire to the fourth wire" and "wherein the first capacitive element to electrically connect in series with the inter-winding capacitance of the first inductor winding". Inter-winding capacitance results from the capacitance

> between the different windings of a transformer and as such is an equivalent capacitance between the windings (see Testing Inter-winding Capacitance). Therefore, "a first capacitor coupling the first wire to the fourth wire" would inherently be in parallel with the inter-winding capacitance between the windings and could not simultaneously be "in series with the inter-winding capacitance of the first inductor winding". As such it is unclear whether the first capacitive element is in series or parallel with the inter-winding capacitance. Further, since inter-winding capacitance is the capacitance between two different windings, the meaning of "the inter-winding capacitance of the first inductor winding" is unclear. Therefore, the claim is indefinite.

(Office Action dated 1-20-04, p. 5)

Claim 23, as amended, states "a capacitive element electrically connects in parallel between the inter-winding capacitance of the first inductor winding and the second inductor winding." Therefore, Applicants respectfully submit that claim 18 is not indefinite or ambiguous and overcomes the above rejection.

CONCLUSION

Applicants respectfully request that this Amendment After Final Action be admitted under 37 C.F.R. §1.116. Applicant submits that this Amendment After Final Action presents claims in better form for consideration on appeal. Furthermore, applicants believe that consideration of this amendment could lead to favorable action that would remove one or more issues for appeal.

It is respectfully submitted that in view of the amendments and remarks set forth herein, the rejections and objections have been overcome. Applicant respectfully requests that a timely Notice of Allowance be issued in this case. An Information Disclosure Statement is also submitted with this amendment. A Notice of intent to appeal is also submitted with this amendment. If there are any additional charges, please charge them to our Deposit Account No. 02-2666.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: 4-20-04

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